

Physics with RHIC spin collider

Hideto En'yo^{a,b}

^a *RIKEN, Hirosawa 2-1, Wako, Saitama 351-0198, Japan*

^b *RIKEN-BNL Research Center, Upton, NY, 11978, USA*

A new era in spin physics has begun in December 2001, with the successful operation of the Relativistic Heavy Ion Collider at Brookhaven National Laboratory as the first polarized proton collider.

The Collider was operated at center of mass energies of $\sqrt{s} = 200$ GeV with transverse beam polarization. First results on single transverse spin asymmetries have been obtained at \sqrt{s} ten times larger than any other measurements in history. Collisions of longitudinally polarized protons are to start in the next run.

Fast and reliable measurements of the proton beam polarization has been performed by newly-developed polarimeters in the both rings, measuring asymmetries for the proton-carbon Coulomb Nuclear Interference. The Collider has delivered luminosity in the order of $10^{30}/\text{cm}^2/\text{s}$ with vertical polarization 15-25%, both of which are expected to be much improved in the coming year.

The PHENIX experiment measured the absolute cross sections and single transverse asymmetries in several channels. The results for the production of charged and neutral pions at mid-rapidity extend the p_t range of present data significantly and will contribute to an improved understanding of the transverse degree of freedom in proton structure functions and partonic fragmentation processes. Surprisingly large lefty-right asymmetries are observed in the very forward neutron measurements by the local polarimeter collaboration, and also by the forward π^0 measurements by the STAR collaboration.

Those results¹ from the first year data are reviewed, and the prospect for the coming years are presented towards our primary goal to solve the spin puzzle of the nucleon.

References

[1] See the talks given in Spin 2002 at Brookhaven National Laboratory, 9-14 September, 2002.